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THE WING MOLTS OF ADULT LOONS: A REVIEW OF THE EVIDENCE

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ADULT loons are generally believed to undergo two molts a year—a postnuptial and a prenuptial. Opinions differ as to whether both these molts are complete, however; and a careful comparison of published statements and examination of specimens has led me to suspect that there is but one really complete molt per year; that the so-called 'complete prenuptial molt', may be only a molting of body plumage concomitant with a much delayed 'postnuptial' molting of remiges; that certain individual loons may undergo a complete post-nuptial molt on or near their breeding grounds, whereas other individuals may, as a result of delayed nidification, be obliged to move southward in full breeding dress; that, in short, the whole molting program may vary so greatly that, unless one can catch and mark a loon in the late summer flightless stage of the molt, and capture the same bird a few months later, again in a flightless stage of the molt, one has no way of being certain that an individual loon ever accomplishes a *complete* molt in late summer or fall, and another *complete* molt the following spring.

In the fall of 1929, while I was on Southampton Island, Hudson Bay, I was impressed with the fact that many young Red-throated Loons (*Gavia stellata*) and Pacific Loons (*Gavia arctica pacifica*) did not leave their nesting ponds until about the middle of September. One brood of young Red-throated Loons lingered as late as September 23, keeping a hole about 15 feet in diameter open in the ice (Sutton, 1932:20). Here the parent birds, which brought fish regularly from salt water a mile or so away, were obliged to alight and take off as best they could until the young birds were strong enough to fly to the sea.

When did those parent Red-throated Loons reach the flightless stage of their post-nuptial molt? Obviously not in the summer of 1929. They had to have their remiges *on them* all that summer. Their first set of eggs had been destroyed, perhaps by an Arctic fox, so their brood was late. Nor was their case exceptional. Many other pairs were as late as they. In their well ordered tundra world it was as

normal for them to be delayed as it was for the foxes and lemmings to be at or near a peak of abundance that year.

Those parent loons may have begun their postnuptial molt immediately after getting their young safely to sea. They may even have completed it before moving southward from Hudson Bay. But it would not surprise me to learn that they reached their wintering grounds in virtually complete breeding plumage, passed slowly into winter body plumage, and eventually completed this postnuptial molt by dropping their frayed, faded remiges about the time the prenuptial molting of the body feathers began. Witherby (Witherby *et al.,* 1940: 112 ff.), Bent (1919:47 ff.), and other writers make it quite clear that molting loons as well as loons in full breeding dress are found on the wintering grounds. A bird in new breeding plumage, with partly grown remiges, would certainly appear to be in the last stages of a complete prenuptial molt—that is obvious. What disturbs me is that we do not know that this same bird lost all its remiges the preceding fall. We are only guessing. It would be easy enough to discuss *the possibility* of two complete molts per year with a great series of molting specimens at hand; less easy to account for two molts; impossible to *prove,* from the specimens alone, that a given individual actually accomplishes them. Why should loons have them? Do loons need two sets of remiges per year while ducks, geese, and swans do not? Both groups are water birds, have the same body-temperature problems, much the same migration problems, near the same degree of feather wear; hence they might be expected to be clothed similarly. There is plenty of evidence to show that loons do go through a flightless period; no evidence, so far as I know (and I have examined loons in a good many collections), that they molt their wings feather by feather as hawks, for example, do. But the question is (as at the outset): Do they molt all the remiges at once, and hence become flightless, *twice* a year? Authors have been assuming too much: because flightless birds have been taken in the fall and also in the spring, they have assumed that all loons have two complete molts per year.

The loons are a small and homogeneous order. The fact that breeding range, general program of migration and nesting are much the same throughout the order makes it easy to believe that the four species molt similarly, though this is not necessarily the case. Let us see what various authors have to say about the molts of the four species of loons.

Gavia stellata. Bent (1919:77) states that adult Red-throated Loons have "two annual molts; a partial prenuptial molt, involving at least all of the feathers on the forepart of the body. . . . I have seen the beginning of this molt as early as December 28, but usually it is accomplished during March and April; and a complete postnuptial molt, during the latter part of the summer, produces the adult winter plumage [which] . . . is often not complete until late in the

season. I have seen birds in very much worn plumage and only partially molted in December; this plumage is worn for a comparatively short time and the molt into it is often incomplete and sometimes not accomplished at all. I have seen a bird in full spring plumage in October and another, in the same month, in regular winter plumage with the full, rich red throat of the nuptial plumage. Fall adults are scarce in collections and, if we had them in large series, we might be surprised to know to what extent old birds retain part or all of their spring plumage during the fall." Forbush (1925:28) says that adults "apparently have a complete prenuptial molt and a complete postnuptial molt." Witherby (Witherby *et al.*, 1940:127) says that the winter plumage is "acquired by complete moult Oct.–Dec. Primaries, primary-coverts and secondaries are moulted simultaneously but wing-coverts normally. . . . Another moult takes place March–May, ... but material is insufficient to decide if remiges are moulted again as in autumn."

As I have pointed out above, the Red-throated Loon's postnuptial molt is certainly not always a late summer phenomenon. Breeding birds get their young ones out to salt water as promptly as they can; but if nesting is delayed it appears that molt is also delayed—until fall or later. Witherby (1940:123) says concerning this matter: "dates of assumption of summer and winter plumage vary greatly; traces of summer plumage may still be retained in January, and in March or April all stages from full winter to three-quarters summer plumage may be seen together." In a series of 12 adults collected August 3 to September 17, 1897, by the Mc Ilhenny Expedition in the vicinity of Point Barrow, Alaska, 11 showed "no molt whatever"; one female, collected September 17, had completed the molt, though the primaries still retained "portions of the sheaths" (Stone, 1900:6).

Gavia arctica pacifica. Bent (1919:69) states that the postnuptial molt of the Pacific Loon is complete, that the prenuptial molt "involves practically all the contour feathers"; whereas Witherby (Witherby *et al.*, 1940:22) describing the closely related *G. a arctica,* says that "specimens available do not show moult of remiges" in the postnuptial molt, "though this may occur," and is sure that the prenuptial molt, which takes place February to May, is complete, the primaries, primary-coverts, and secondaries being then molted simultaneously. Forbush (1925:27) flatly asserts that both molts are complete.

According to what I witnessed on Southampton Island, I should say that most Pacific Loons have no time for a flightless period in late summer. They are busy flying in with fish for their young until fall. Whether they molt near their breeding ponds I cannot say. I did not record the species in 1929 after September 27; saw no shed feathers about the breeding ponds; neither saw nor heard of a bird in flightless condition (Sutton, 1932:14). I should say that the postnuptial molt could not well have started before October 1 in most

individuals. Just where the birds were by that date is a question. Probably they were on their way south. Since the winter home of the Pacific Loon is said to be "the Pacific coast of North America from Puget Sound to Lower California" (Peters, 1931:35), one thinks of the fall migration from Southampton Island as a long flight, or series of flights from lake to lake perhaps, across western Canada; and one wonders whether that trip may not customarily be taken before the remiges are molted. It is, I believe, significant that of 49 adult specimens collected July 5 to September 20, 1897–98 by the Mc Ilhenny Expedition to Point Barrow, Alaska, only four had molted their remiges. These four were in "full winter dress" (Stone, 1900:5).

Gavia immer. Concerning the Common Loon, Bent (1919:52) says: "The adult winter plumage . . . is worn for only a short time, as in the second year bird; specimens in this plumage are very scarce in collections and it is difficult to find one that is not either molting into it or out of it; the postnuptial molt into it begins sometimes by the last of August, but sometimes not until October; and the prenuptial molt out of it may begin in November or later in the winter and may not be completed until spring. Apparently some individuals, perhaps very old birds, do not assume this winter plumage at all, for I have seen birds in fully adult breeding plumage in September, October, and November." Forbush, (1925:17, 18) uses this passage from Bent almost verbatim. Witherby (1940:115) believes that the winter plumage "is acquired by complete moult Aug. (sometimes July) to Jan. Primaries, primary-coverts and secondaries are moulted simultaneously but wing-coverts and innermost secondaries normally. Sometimes some old summer body feathers, wing-coverts and innermost secondaries are retained until next moult. . . . Another complete moult similar to that of autumn takes place Feb.–May."

These statements make it clear that an adult Common Loon is molting three-quarters of the time. For a short period, in summer (part of May, all of June, part of July) they are apt to be in complete breeding dress. The rest of the time they are in more or less mixed plumage. But when is the postnuptial molt, which begins "sometimes July," finished? May not the dropping of the remiges often be delayed until the following winter or spring?

In this connection it is probably significant that published records of flightless molting *Gavia immer* are so few. Forbush (1925:18) tells us of one he picked up at Nantucket on March 12, 1921. J. B. May (1930:412) describes several examined by him in Massachusetts April 1 to 4, 1930, and reports one "in the gray plumage" shot by Sidney Chase at Nantucket on February 21, 1892. There is apparently no record of a flightless Common Loon found in late summer or fall. Have flightless late summer *Gavia immer* been handled repeatedly but not reported because they were considered in no way unusual? Or have ornithologists continued merely to assume, without investigating the

matter thoroughly, that all loons go through a flightless stage at the nesting lake as soon as the young are abroad?

Gavia adamsii. "The seasonal molts and plumage of the adult [Yellow-billed Loon] are, evidently, practically the same as in the common loon. . . . The molt into the winter plumage is very irregular and much prolonged, and the plumage is worn for only a short time. . . . [Collett, 1894] refers to a specimen taken on September 22 in which the molt had begun, others taken in October and November in transitional stages, and one taken on October 5 in which the summer plumage was almost entirely retained. . . . The two molts are so prolonged and so irregular that they may almost be said to overlap" (Bent, 1919:62). Witherby (1940:118) says of the postnuptial molt that there are "very few moulting examples available," but that the Yellow-billed "appears to moult" as in the Common Loon, that is, completely; he seems sure that the prenuptial molt is complete.

It is evident that individuals of the species may complete a late summer postnuptial molt on or near the breeding grounds since an adult bird was collected by the Mc Ilhenny Expedition at Point Barrow, Alaska, on September 29, which had "new wings . . . only half grown" (Stone, 1900:5); but it is quite believable that, had this individual lived, it would not have molted its remiges again the following spring.

Remarks

The above brief review has been presented not as proof that adult loons molt their remiges only once a year, but rather to show that further careful observations must be made before we can be sure that they molt their remiges twice a year. Of great importance is the recording of all adult loons known to be in flightless condition as a result of molt. Ornithologists who happen to live near nesting lakes of *Gavia immer* should observe the birds carefully in late summer and early fall, ascertaining whether they are actually flightless at any time, and checking on the observation by gathering molted remiges. A technique of capturing loons for examination and banding needs to be worked out.

It may be years before an adult loon, flightless because of molt, is captured and banded (or marked in some other way), and captured 6 to 8 months later, again in flightless condition because of molt. Until that feat is accomplished we may well refrain from statements that imply two *complete* molts per year in any Gaviiform species.

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